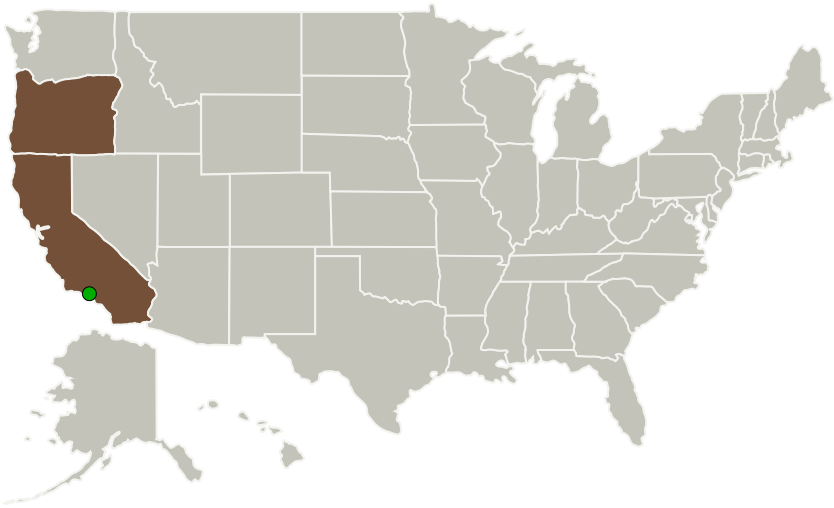
High Channel Count Time-to-Digital Converter and Lasercom Processor, Phase I

Completed Technology Project (2015 - 2015)

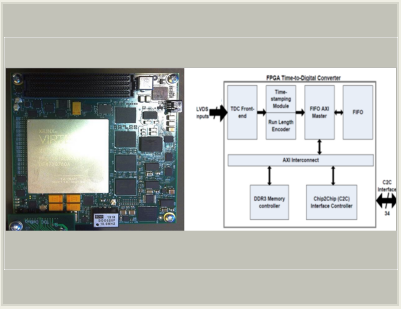
Project Introduction

A multi-channel FPGA-based time-to-digital converter (TDC) is needed to process the output from single-photon focal plane arrays used in lasercom. Leveraging an existing 64-channel design shown capable of better than 30 ps. time resolution and 256 channels with 120-ps time resolution, scalable 512-channel (threshold) and 1024-channel (objective) TDCs with optional multicore image processor will be developed, which can process and transmit data continuously. In Phase I, leveraging the existing technology, we will demonstrate existing multichannel TDC processors, including several with single-photon avalanche photodiode (SPAD) detectors. After refining the requirements and generating a controlled specification of NASA requirements, we will then design of the High-channel-count Time-to-digital Advanced Processor (HiTAP) module capable of better than gigaphoton per second rates in a first-in/first-out (FIFO) -buffered continuous stream, with the goal of achieving kilo-channel designs capable of gigaphoton count rates.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Voxtel, Inc.	Lead Organization	Industry	Beaverton, Oregon
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California



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Completed Technology Project (2015 - 2015)

Primary U.S. Work Locations	
California	Oregon

Project Transitions

June 2015: Project Start

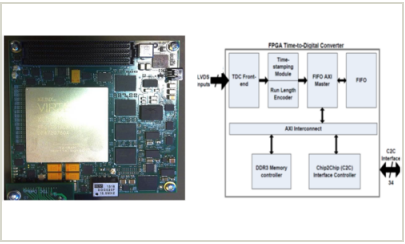
December 2015: Closed out

Closeout Summary: High Channel Count Time-to-Digital Converter and Laserc om Processor, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/138909)*

Images



Briefing Chart Image
High Channel Count Time-to-Digital Converter and Lasercom Processor, Phase I
(https://techport.nasa.gov/image/127629)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Voxtel, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Vinit Dhulla

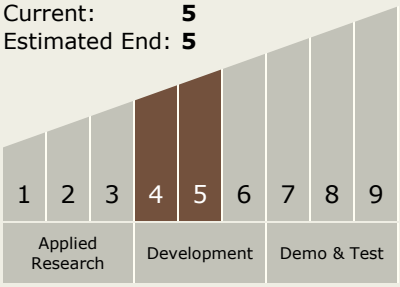
Co-Investigator:
Vinit Dhulla

High Channel Count Time-to-Digital Converter and Lasercom Processor, Phase I

Completed Technology Project (2015 - 2015)

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.1 Optical Communications
    - TX05.1.1 Detector Development

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System